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Land Use and Transportation Issues in Environmental Control

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Analyses have been made of the effects of environmental controls and planning at regional, subarea, and project levels. The results obtained at the regional level are reviewed for a proposed highway development around Baltimore, Md. The findings for both short-term and long-term effects of alternative transport policies are summarized in respect of population and employment, economic indicators, traffic and travel, air quality, water and solid waste, noise, and environmentally sensitive areas. Problems at subarea and project levels are briefly considered.

Many of the controls which affect pollution are implemented at the source, e.g., the use of scrubbers on smokestacks or the emission control devices on automobiles. However, other controls—land use and transportation planning and controls—can have a positive effect on air, water, and other environmental areas if properly implemented. The purpose of this paper is to discuss some of these tools in practice and their interaction with each other, with respect to the environmental and other controls.

The analysis of the effects of environmental controls and planning will be presented at three levels: (1) regional (a case study based on a review of the long-range effects of alternative transportation and land use plans in the Baltimore region); (2) subarea (a discussion of controls and land use planning on a smaller geographical area); and (3) project level (a brief discussion of the area where the greatest impacts can be identified). In addition, pertinent issues with regard to environmental controls as related to land use and transportation will be discussed. These include institutional issues such as jurisdictional, legal, administrative, and funding problems as well as specific issues such as growth control as affected by the contrary goals of clean air vs. sewer and water treatment.

There is a need to consider all levels of effects—regional, subarea, and project level —simultaneously in terms of the geographic distribution of impacts and the temporal variation over the long and short term.

Regional Analysis

On the regional level, the Baltimore Regional Environmental Impact Study (BREIS) was conducted to assess the effects of alternative transportation and land use policies on the environment to aid decision-makers by providing information on environmental effects of building or not building transportation facilities in the region. Concern was particularly focused on the interstate highway system (the 3-A System)

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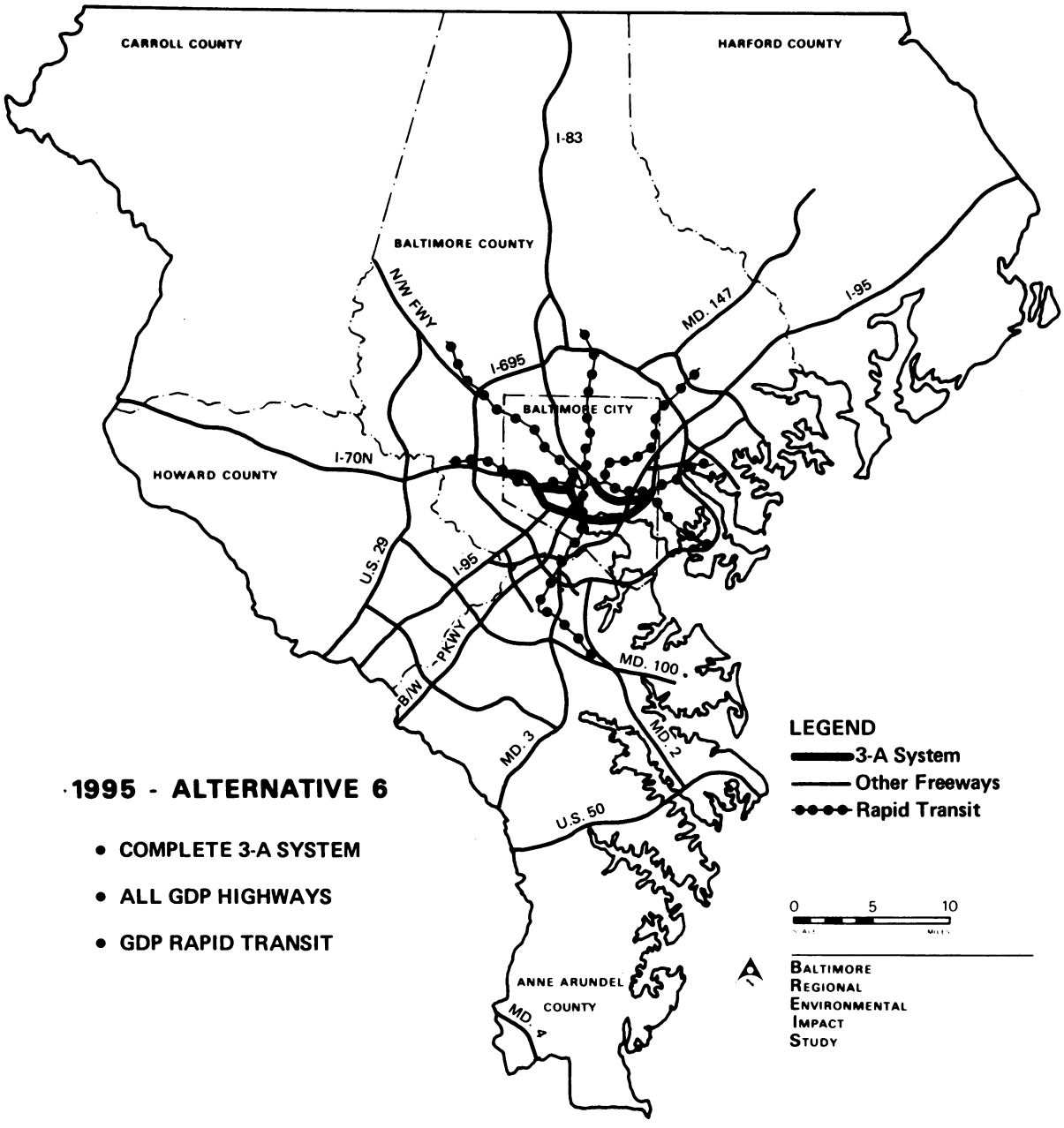

FIGURE 1. Summary of alternatives. Alternative 6 (1995): complete 3–A system; all GDP highways; GDP rapid transit.

proposed for construction in the City of Baltimore and the General Development Plan (GDP) for road improvement in the region. Impacts on air, noise, water, solid waste, ecology, socioeconomic, traffic and energy elements were assessed for alternative transportation and land use policies.

The problem was to examine the short-term (1980) effects, both with and without the interstate highways, and the long-term (1995) effects, also with and without the highways.

The process was conducted by a multidisciplinary team of consultants in associa-

tion with federal, state, and local agencies. Unlike most past studies which assumed a specific pattern of development would exist that would require certain transportation facilities, the BREIS recognized that building transportation routes creates demands and opportunities for development. For each transportation policy developed, land activity was varied accordingly. In this way alternatives which were examined could be viewed in their entirety.

The alternatives ranged from building the complete interstate system to building only portions of it and included a no-build alternative. A regional rapid transit system was assumed for all alternatives. At the time the study was conducted, no transportation control plan for air pollution had been officially adopted for the region, therefore no transportation control strategies were assumed in the study. The summary of alternatives is shown in Table 1. Figure 1 graphically illustrates the full transportation system, including the 3-A system, as planned for 1995.

The following is a summary of findings of the study for the Baltimore Region. It should be noted that the BREIS scope did not include all elements which should be considered in the decision process; therefore

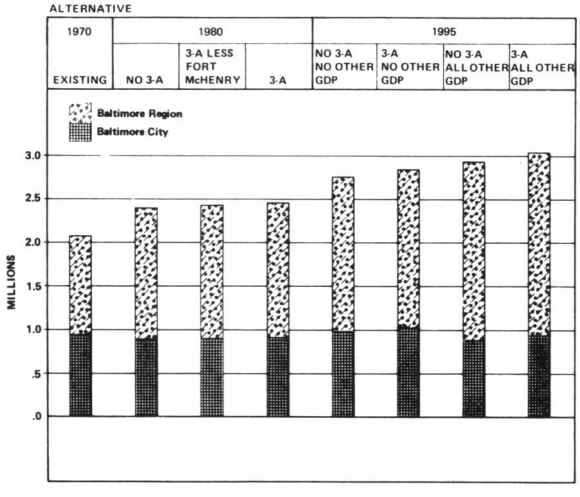

FIGURE 2. Population

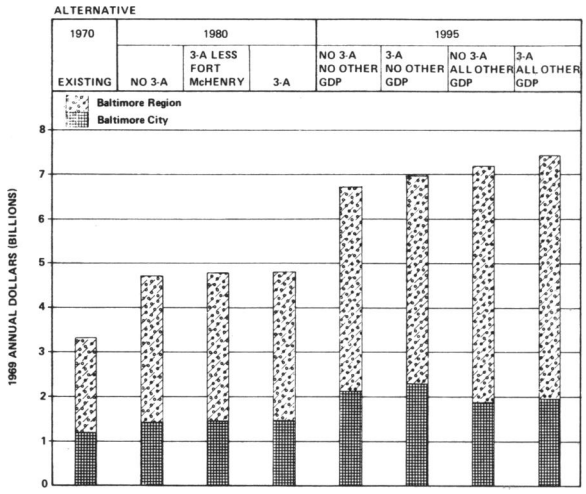

FIGURE 3. Retail sales.

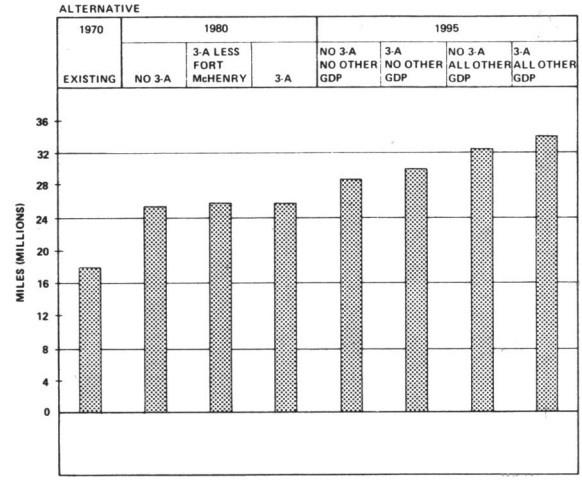

FIGURE 4. Daily (24-hr) vehicle miles of travel.

there are no recommendations with regard to overall regional development policy.

The data in Figures 2–7 are arranged in estimated increasing order of capital cost for the alternatives. This permits an approximation of cost-effectiveness evaluation.

Population and Employment

Short-Term (1980): If the full 3-A system is built, there will be 28,000 more people in Baltimore City and 17,000 more in the region than if the system is not built. Building the 3-A system results in 15,000 more

jobs in Baltimore City and 4,000 more in the region than if it is not built.

Long-Term (1995): If the 3-A system is built and all other General Development Plan (GDP) highway improvements are made, the regional population will be about 10% higher than if no highways are built or improved. Baltimore City population would be about 72,000 persons less in this comparison. Regional employment figures would be about 6% higher and Baltimore City employment 5% higher if the full highway program is implemented.

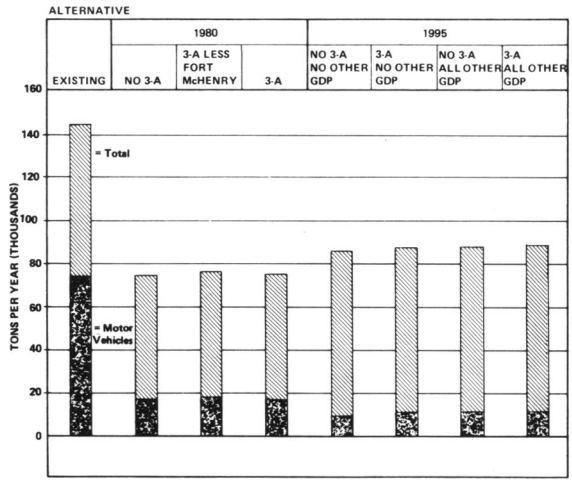

FIGURE 6. Hydrocarbon emissions.

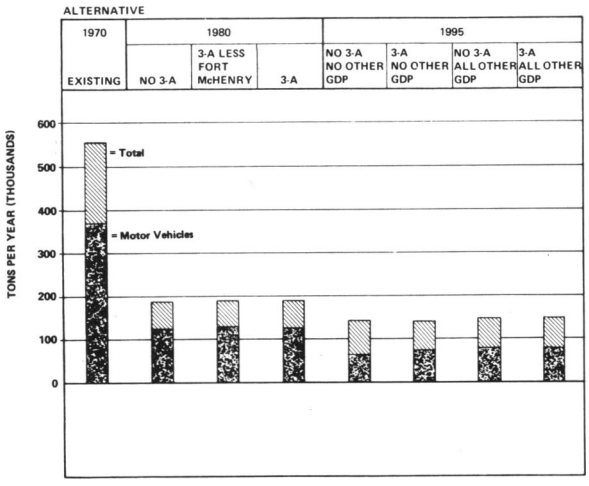

FIGURE 5. Carbon monoxide emissions.

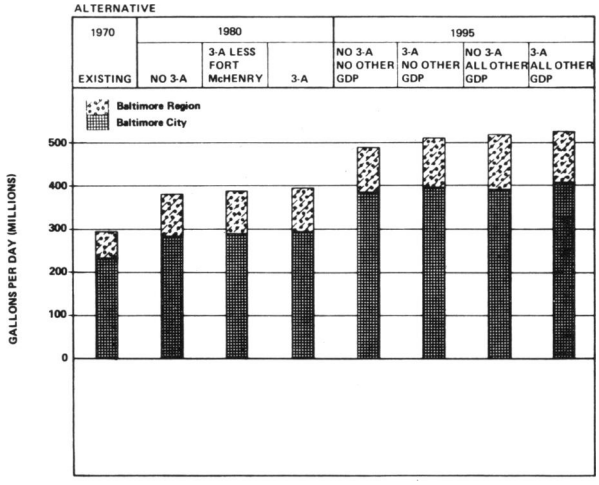

FIGURE 7. Water required.

Table 1. Transportation alternatives for Baltimore Regional Environmental Impact Study (BREIS)

Alternative	Year	Highway assumption		Rapid Transit assumption
		3-A Interstate	Other highways	
1	1970	Existing	Existing	None
2[a]	1978	Existing and programmed	Existing and programmed	Phase I
3	1980	Complete	Existing and programmed	Phase I
4	1980	Partial	Existing and programmed	Phase I
5	1980	Existing and under construction	Existing and programmed	Phase I
6	1995	Complete	GDP	GDP
7	1995	Existing and under construction	GDP	GDP
8	1995	Complete	Existing and under construction	GDP
9	1995	Existing and under construction	Existing and under construction	GDP

[a] Eliminated in favor of Alternative 9.

Economic Indicators

Short-Term (1980): City payroll would be higher by about $110 million annually and regional payrolls by $23 million annually if the 3-A system were built. Retail purchasing power would be $42 million more annually in Baltimore City and $16 million more in the region. Retail sales in the City would amount to $85 million more annually and $16 million more in the region. The value of new commercial construction would be $77 million more annually in the City and $21 million more in the region.

Long-Term (1995): Building the 3-A system and other GDP improvements maximizes economic growth in the region. Payrolls and retail sales are higher by $1.74 billion and $750 million annually over the no-build alternative. (Figures are expressed in 1969 dollars).

Travel Situation and Traffic Analysis

Short-Term (1980): Travel time and congestion levels will tend to increase over the 1970 base, whether or not the 3-A system is built. Overall vehicle miles of travel will increase, but there will be only slight differences on a regional basis whether or not the 3-A system is built. Transit usage will be slightly higher if the 3-A system is built, but all 1980 alternatives will have lower transit usage than 1970.

Long-Term (1995): If the full highway system is built by 1995 the result will be 16% more vehicle miles of travel than if the system is not built. On a 24-hr basis, mean trip speed is 25 mph for the region if the full system is built, while under the no-build alternative mean trip speed is 17 mph. There will be approximately 10% more trips made with the full 3-A system and GDP improvements than under the no-build alternative. The no-build alternative will result in 4,000 fewer daily transit trips than with the full highway program; the proportion of transit trips would be higher, however.

Air Quality

From an air pollution viewpoint, after 1980 there will be no violation of the carbon monoxide air quality standard. However, there will continue to be a violation of the hydrocarbon guideline level primarily due to the growth in stationary rather than mobile source pollution, and as a consequence, predicted violation of the photochemical oxidant standard for some period of time between now and 1995. These findings hinge, however, on effective implementation of Federal Motor Vehicle Emission Controls for new vehicles.

Water and Solid Waste

The difference in effects of the transportation alternatives will be minor in the short-term (1980) and long term (1995) plans.

The suburban growth and development impacts of completing the GDP highway improvements are most significant with respect to increased flooding risk in the Gwynns Falls, Magothy, and Severn River basins. The 3-A system *per se* would have little direct impact on this problem. Waste water flows will be approximately 8% greater if the 3-A system and GDP highways are completed as compared to the no-build alternatives. Solid waste production will be approximately 10% higher if the full highway system is constructed.

Noise

Short-Term (1980): Approximately 4% more per capita residential noise dosage in excess of standard is produced by the 3-A system when compared to the no-build alternative on a regional basis. In Baltimore City, this figure is about 2% higher dosage if the 3-A is built.

Long-Term (1995): On a regional basis, the full 3-A system and GDP improvements produce approximately 10% less residential noise dosage per capita in excess of standard than the no-build alternative. In Baltimore City this figure is approximately 3% greater in the full 3-A and GDP highways are built. In general, in the BMATS area (Baltimore

Metropolitan Area Transportation Study) residential noise dosages will be relatively lower than under existing conditions for all alternatives.

Environmental Sensitive Areas

Analysis of environmentally sensitive areas is dependent on population distribution. In the short term (1980) the 3-A system will not have a marked regional environmental impact. In the long term (1995), construction of the 3-A system and other GDP improvements increases population by about 10% and the environmental impact by 28% over the no-build alternatives.

Subarea Analysis

In addition to the specific findings described above, the value of the BREIS type of analysis for environmental control is that it is a process for continuing assessment and can be brought to the subarea or project level. It provides a significant data base and serves as an overall framework in which to examine tradeoffs and serves as a tool for decision makers in making long term decisions.

The Clean Air Act of 1970 provided that air quality standards should be attained and maintained in urban areas. State implementation plans for air quality have been prepared and submitted to the U.S. Environmental Protection Agency which include control strategies and compliance schedules for achievement but which failed, for the most part, to describe how air quality would be maintained after having been reached in the target year. As a result, EPA is requiring states to designate Air Quality Maintenance Areas (AQMA) and to develop plans for these areas.

Guidelines have been developed for air quality maintenance planning and by June of 1975 plans for AQMAs must be prepared and submitted by the Governors to EPA. In general, an AQMA corresponds to a Standard Metropolitan Statistical Area (SMSA); they may be defined as counties or groups of counties in the SMSA. By the summer of 1974 some 160 SMSAs had been designated as AQMAs; these will be finalized by the end of 1974. If all of these areas had a study of the BREIS type available there would be little problem in assessing the effects of land use and transportation controls for air quality maintenance over the long term (10 yr); however, such sophisticated analyses are not readily available, and other approaches will be applied in most metropolitan areas. One problem with the analysis at this level is that the data tends to be of uneven quality and reliability. Emissions and air quality information generally does not coincide with that for land use and transportation plans. The modeling techniques tend to be more highly developed than those for air quality; therefore the results tend to be uneven. EPA, however, is suggesting a phased approach which will focus first on improving source controls and will allow local areas to develop land use and transportation plans over a longer time frame for air quality maintenance. This will also permit consideration of other planning and development activities on a systematic basis. For example, air quality maintenance controls of land use may conflict with other goals, such as wastewater treatment and sewer extensions which tend to encourage development.

Some significant efforts at subarea analysis are in process. For example, the Northeastern Illinois Planning Commission in the Chicago area is conducting a county-wide study of environmental health effects to be incorporated into the regional plan. Fairfax County, Virginia is developing the PLUS (Planning-Land Use System) model to integrate and test the effects of alternative patterns of growth in the county and on the environment.

Project Level

Project level analyses of environmental effects of actions are, of course, the most numerous and represent the type with which

we have the most experience. An Environmental Impact Statement is required for any significant federal action such as highway construction, transit, urban renewal projects, and so forth. In addition many states are requiring similar assessments for projects not covered by the federal action.

The requirement for the EIS comes from Section 102(2)(C) of the National Environmental Policy Act of 1969. The development and implementation of the process has been arduous and is still undergoing modification and review. The most significant factor outside of the fact that all potential adverse effects of an action should be evaluated under the Act is that the "do nothing" alternative must also be examined. The results of this type of analysis often indicate that the status quo is not necessarily the best condition when all factors are considered. For example, it may be shown that the construction of a highway in a highly congested area may actually reduce air pollutants by increasing auto speeds on the facility, thus reducing the speed-related pollutants.

The Environmental Protection Agency has promulgated regulations for another type of review, related only to air quality under the Clean Air Act of 1970. This is the indirect source review required to examine the effects of building new facilities or developments which do not of themselves create pollution, but which attract automobiles. An extensive analytic procedure is required for permit application to EPA before the project can proceed. Included in indirect source review are new developments, such as shopping centers with parking in excess of 1,000 vehicles, new highways with estimated daily traffic in excess of 20,000, and airports. States may define their own indirect source regulations if they are more stringent than the federal program. These and other controls promulgated by EPA have recently come under criticism at the local level and in Congress. It will take some time and experience with the state-of-the-art to resolve many of the political and technical issues.

Summary

There is a need to consider all issues in the planning-environmental context. Impacts should be viewed within the framework of their interrelationships with other actions; they should be evaluated at the regional, subarea, and project level; and the effects of the "do-nothing" action should also be considered.

There is a real question of how to maintain general public health and safety while at the same time evaluating other goals such as good housing, an acceptable standard of living, the production of goods and services, adequate income, and mobility. The environmental concerns tend to take second place to the potential of closing production plants employing many workers, especially in a time of economic decline.

There are institutional issues which are reflected in the ability of federal, state and local agencies to work cooperatively to develop and implement programs. Often the lines of authority and funding are unclear, and the result is that nothing gets done or may be done inefficiently due to misunderstandings or an inability to recognize diverse goals. In many areas the regional planning agency is the most likely to perform the technical analysis and develop the plan but in most areas such an agency does not have the power to implement or to enforce. In addition, funding is not always available to the appropriate agency.

Legal aspects of the relationship between planning and environmental issues have been evolving for the most part from case law as the response to the Clean Air Act, the National Environmental Policy Act, the Water Quality Control Act, and others. The balance between trying to maintain public health and welfare and the possible restriction of free action in the market as related to development, construction, and mobility goals has yet to be defined. The effects of such controls to improve the environment should have a beneficial result if properly managed and implemented.